

**FULL MATCH (FM) SEARCH ALGORITHM IMPLEMENTATION  
FOR A NETWORK PROCESSOR**

**ABSTRACT**

Novel data structures, methods and apparatus for finding  
5 a full match between a search pattern and a pattern stored in  
a leaf of the search tree. A key is input, a hash function is  
performed on the key, a direct table (DT) is accessed, and a  
tree is walked through pattern search control blocks (PSCBs)  
until reaching a leaf. The search mechanism uses a set of data  
structures that can be located in a few registers and regular  
10 memory, and then used to build a Patricia tree structure that  
can be manipulated by a relatively simple hardware macro.  
Both keys and corresponding information needed for retrieval  
are stored in the Patricia tree structure. The hash function  
provides an n->n mapping of the bits of the key to the bits of  
15 the hash key. The data structure that is used to store the  
hash key and the related information in the tree is called a  
leaf. Each leaf corresponds to a single key that matches  
exactly with the input key. The leaf contains the key as well  
as additional information. The length of the leaf is  
20 programmable, as is the length of the key. The leaf is stored  
in random access memory and is implemented as a single memory  
entry. If the key is located in the direct table then it is  
called a direct leaf.